



MANAGERIAL ANTECEDENTS OF SUCCESSFUL IKT INNOVATION

The Case of Electronic Patient Records (EPR) in Public Health Systems

Hansen, Morten Balle; Nørup, Iben

Publication date:
2015

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Hansen, M. B., & Nørup, I. (2015). *MANAGERIAL ANTECEDENTS OF SUCCESSFUL IKT INNOVATION: The Case of Electronic Patient Records (EPR) in Public Health Systems*. Paper presented at The Annual Meeting of The Danish Political Science Association, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

MANAGERIAL ANTECEDENTS OF SUCCESSFUL IKT INNOVATION

The Case of Electronic Patient Records (EPR) in Public Health Systems

Paper prepared for the Panel on Innovation and Entrepreneurship in the Public Sector at the annual meeting of The Danish Political Science Association at Hotel Koldingfjord, Denmark, October 29-30 2015.

By

Morten Balle Hansen, Department of political science, Aalborg University, e-mail:

mbh@dps.aau.dk

And

Iben Nørup, Department of political science, Aalborg University, e-mail: ibenn@dps.aau.dk

Abstract

This study analyses to what extent differences in the management of change may have an impact on the outcome.

Theoretically we combine an institutional approach emphasizing context and field level trends with a generic change management approach.

Empirically we analyse the implementation of an IKT innovation in a Danish multi-site hospital. In a quasi-experimental research design, surveys to more than 2000 employees before and after the intervention were conducted as well as qualitative interviews with change agents.

Our findings indicate how managers can make a significant difference through the ways they organize the process, involve the employees and provide information.

Key words: Managing change; innovation; institutional theory; IKT; Health care

Outline:

Abstract

1. Introduction
2. Management of change in public organizations
3. Empirical context
4. Research design and methods
5. Findings
6. Discussion
7. Conclusion

References

Appendix

INTRODUCTION

In this paper we analyse to what extent and how differences in managerial behaviour in organizational change processes may have an impact on the successful implementation of a new Information- and Communication Technology (ICT) system in the hospital sector.

The paper is embedded in the literature on the management of change in public organizations and combines institutional theory with its emphasis on context and field level trends with generic change management theories and their emphasis on the importance of deliberate change strategies.

The challenges of leading change processes and implementing policy decisions has been a core issue in public administration for decades (Pressman & Wildawsky, 1973) and recent reviews of the literature emphasize the continuing importance of the subject (Fernandez & Rainey, 2006; Kuipers et al., 2014).

Information and Communication Technology (ICT) innovation was on the agenda as an important issue in earlier decades of public management reforms (Hood, 1991), and a number of more recent seminal studies indicate its gradual movement to the core of the Public Administration agenda (Dunleavy, Margetts, Bastow, & Tinkler, 2006, 2008; Fishenden & Thompson, 2013; Hood & Margetts, 2007).

ICT are being associated with high hopes as the proposed General Purpose Technology (GPT) that holds solutions to both public and the private sector problems (Andersen, 2007; Brynjolfsson & McAfee, 2014). Some early estimates for instance suggest that up against 50

percent of all new capital investments in organizations since 1980 had been in Information Technology (Westland & Clark, 2000).

The health care sector is no exception and an important subgroup of ICT systems developed in this sector is the Electronic Patient Recording (EPR)¹ systems in which medical records of patients are stored electronically. EPR systems has been implemented extensively in eldercare (Hansen & Vedung, 2005) and health care systems (Maillet, Mathieu, & Sicotte, 2014) around the world and high hopes and many resources has been invested in them.

So far however the potential benefits of EPR systems remain largely unresolved although a recent review indicate that the benefits of the technology are beginning to emerge (Buntin, Burke, Hoaglin, & Blumenthal, 2011) and a number of tensions and paradoxes related to their implementation and utilization has been revealed (Trisha Greenhalgh, Potts, Wong, Bark, & Swinglehurst, 2009). Also for public sector ICT systems more generally it has been estimated that ‘... something like 20 percent to 30 percent of all developments are total failures in which projects are abandoned. Around 30 percent to 60 percent are partial failures in which there are time and cost overruns or other problems. The minority are those counted as successes’ (Goldfinch, 2007, p. 917).

It is in this context that our case study in the present paper should be seen. In the case analysed a new Electronic Patient Recording (EPR) system was adopted and implemented in a multi-site hospital in Denmark with around 5000 employees working in more than 25 departments on five different locations in the region of southern Denmark. The

¹ Alternative labels often used interchangeably are Electronic Health Records (EHR) or Electronic Medical

implementation process analysed took place from March to early July 2015 with a pre-adoption survey conducted in January-February and an after-implementation survey conducted in June-early July 2015 and interviews conducted in March and early April.

The implementation process was characterized by a number of interesting features including technical problems with the new EPR system and innovative experiments with training programs for employees. In our analysis however, we focus on the ways leaders may make a difference to the change process. The analysis is designed to answer three questions of which the former two are prerequisites for answering the third and most important one:

1. How strong was the initial support for the intervention?
2. To what extent did the support for the intervention change during the change process?
3. To what extent and how did differences in managerial behaviour have an impact on the varying support to the intervention during and after the change process?

In what follows we first review the literature on the management of change in public organizations followed by a brief presentation of the empirical setting.

We then explain our research design, data and methods of analysis.

Then the findings from the empirical analysis as they relate to our research questions are presented followed by a discussion of possible interpretations and implications of our findings as well as the limitations of our analysis. In the end a brief conclusion is given.

RESEARCH IN THE MANAGEMENT OF CHANGE IN PUBLIC ORGANIZATIONS

Our brief examination of the literature takes a recent review of the literature on the management of change in public organizations (Kuipers et al., 2014) as point of departure. They organize their review around five core factors of change processes: Context, content, process, leadership and outcome. Based on an examination of 133 articles published from 2000 to 2010 they conclude that the literature in this field of research is rather dispersed: 'The 133 articles that we identified were published in 51 different journals and used approximately 20 different theoretical angles to study change in a wide range of sub-sectors.' (pp. 14-15) They also found that there was a US / Anglo-Saxon bias in the studies and that most studies did not address the outcomes of organizational change or the level of success. In their discussion of how to make progress in future research they make an observation and a recommendation that we find particularly useful:

'We identified a gap between the theoretical perspectives employed and suggest that scholars look for opportunities to use the strengths of different theoretical approaches to study the field (1). The institutional theory, which is highly context-aware, in combination with the generic change management literature, with its detailed attention to process, behaviour, and leadership, may particularly help to better understand the complex multi-layered phenomena of change in the public sector. ...' (Kuipers et al., 2014, p. 16)

At a general level this recommendation is as old as the discussion of the micro-macro link in social science (See for instance Alexander, Giesen, Münch, & Smelser, 1987; Bourdieu, 1990; DiMaggio & Powell, 1991; Giddens, 1984; Scott, 2001). But it is also a very useful recommendation in this specific context. Institutional approaches to public sector change

have been criticized for neglecting agency, while change leadership approaches has been criticized for neglecting the broader context. Thus acknowledging and applying both perspectives when analysing public sector change enables the analysis to navigate between Scylla (neglecting agency) and Charybdis (neglecting structure and context). The cost is of course an increased complexity in the analysis but the gains is hopefully a more nuanced and better understanding of the change process. Thus our analytical strategy is to perceive the two traditions as complementary perspectives (Allison, 1969; Breidahl, Gjelstrup, Hansen, & Hansen, 2015; Roness, 1997) that supplement each other to provide a better understanding of the change process.

Institutional theory

Institutional theories emphasize context and tend to argue that the most significant drivers of organisational change are in the organisational environment. In a global version of sociological institutionalism (Hansen & Lauridsen, 2004; Meyer, Boli, Thomas, & Ramirez, 1997), an evolving world culture is envisioned as the most significant driver of change in the post-world war era. It is argued that *'Many features of the contemporary nation-state derive from world-wide models constructed and propagated through global cultural and associational processes'* (Meyer et al., 1997, pp. 144-145). In the historical version of institutionalism the notion of national and local path-dependencies is emphasized (Hall & Taylor, 1996; Rothstein, 1998). Thus global trends, important and powerful as they may be, are expected to show significant local variation when they face and are adapted to a specific organisation.

In our analysis we use the two institutional notions of 1) an evolving world culture propagating worldwide models of innovation and organizing and 2) national and organizational path-dependencies that enforce adaptation and translation of the global models at the

organizational level. We use these notions to guide our understanding of the broader context in which the analysed change process takes place.

Change management

Research in the management of change processes is primarily based on case studies and is characterized by attempts to develop rules of thumb for leaders on how best to deal with change (Fernandez & Rainey, 2006; Kotter, 1995; Yukl, 2010). Perhaps most well-known is Kotters eight steps to transform the organization (Kotter, 1995), which has its roots in Kurt Lewins classical unfreeze-change-freeze model (Armenakis & Bedeian, 1999, p. 301; Hatch & Cunliffe, 2006, pp. 309-310; Lewin, 1947). Kotters approach has influenced many leadership textbooks (e.g. Yukl, 2010) and within public administration the eight factors suggested by Fernandez and Rainey pretty much resemble Kotters eight steps and thus also Lewins three stage model (Fernandez & Rainey, 2006, pp. 169-173): 1) ensure the need; 2) provide a plan; 3) Build internal support for change and overcome resistance; 4) Ensure top-management support and commitment; 5) Build external support; 6) Provide resources; 7) Institutionalize change; and 8) Pursue comprehensive change. Such lists have of course been criticised heavily for their superficial and slogan-like characteristics and for their lack of attention to context specific factors (e.g. Kuipers et al., 2014, p. 16). None-the-less they have been very popular among practitioners, are empirically based on interpretations of numerous case studies and the significance of change management also tend to lend support in quantitative approaches (e.g. Hansen, 2011). In our analysis we will compare the strategy applied by the management in our case study with the recommendations from this literature and discuss how our findings relate to this perspective.

Hypotheses concerning managerial antecedents

Primarily quantitative researches in IKT systems in general and in EPR systems in particular has examined the importance of a number of factors in terms of their impact on various measures of outcomes (including quality, efficiency, and provider satisfaction) in the health care sector (Buntin et al., 2011; Car et al., 2008; T. Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Maillet et al., 2014; Nørup & Hansen, 2015). Reviews of this research indicate that although the majority of more recent research show positive outcomes there have been problems in harvesting the potential benefits from IKT systems and that more research is needed ‘... that document the challenging aspects of implementing health information technology more specifically and how these challenges might be addressed’ (Buntin et al., 2011, p. 470).

Although technological and other factors rather than managerial antecedents has been in focus in this literature (Lin, Lin, & Roan, 2012) managerial antecedents has also been examined. One of the findings is that successful implementation tends to be significantly related to active support and communication from managers at all levels (T. Greenhalgh et al., 2004; Nørup & Hansen, 2015). Thus we would expect that

H1: Higher levels of perceived outcome among the users of the new EPR system is significantly positively related to higher levels of information and managerial support to the employees in the implementation process

Research findings also indicates that ‘... early and widespread involvement of staff at all levels, perhaps through formal facilitation initiatives, enhances the success of implementation and routinization’ (T. Greenhalgh et al., 2004, p. 611). Thus we would expect that

H2: Higher levels of perceived outcome among the users of the new EPR system is significantly positively related to higher levels of influence and involvement of the employees in the implementation process

Research findings furthermore indicates that ‘ ... if an innovation is adapted to the local context, it is more likely to be successfully implemented and routinized’ (T. Greenhalgh et al., 2004, p. 612). The EPR innovation in focus here is designed to be used in many different hospital settings, but it is hardly adaptable to the specific hospital in focus here. But the process of implementing the innovation can be adapted to specific departments. Two of the departments

H3: Higher levels of perceived outcome among the users of the new EPR system is significantly positively related to an implementation strategy that has been planned and adjusted especially for the particular department

Controls

Other factors than managerial behaviour tend to be significantly related to the outcome of implementation of IKT innovation. The organisational culture of doctors and nurses has been examined and found to be significantly related to outcome (Callen, Braithwaite, & Westbrook, 2009). Thus we include dummy variables for specific professions in the analysis.

We also expect that some functional characteristics of the departments may be significant to the implementation process. In particular we expect departments with many unplanned acute patients to be more vulnerable. We include a measure of that in our models.

Finally we include gender as a control variable in the analysis.

EMPIRICAL CONTEXT

Since the latter part of the 1990s, various types of Electronic Patient Records (EPRs) gradually gained a foothold in Danish hospitals (DanskeRegioner, 2007; Deloitte, 2007; Warfvinge, 2012) and since the early 2000s different versions of EPR systems were in use at almost all Danish hospitals.

In the Danish Municipal Reform in 2007 the fourteen old counties were merged into five regions still in charge of the Danish hospital sector.

After the reform it was politically decided that each of the five newly created regions should standardize their EPR systems and choose one unitary system in each region. There were no attempts to standardize across regions and thus each region faced a choice.

In the region of Southern Denmark, in which our hospital is located, it was decided to introduce a specific EPR system at all the hospitals in the region. The chosen system had been fully implemented in 2009 at the largest hospital in the region and it was decided that all other hospitals in the region should switch to that system within a couple of years.

The chosen EPR system consists of several different packages of which the most important are the patient recording part and an administrative part.

At the hospital analysed here the administrative part was already implemented in 2012 while the implementation of the patient recording part – the core of the EPR system – was postponed several times, but in the spring 2015 the implementation was conducted and it is this process we analyse here.

The hospital in focus is a multi-site hospital with around 5000 employees working in more than 25 departments on five different locations in the region of southern Denmark. The

implementation process analysed took place from 4th March to early July 2015 with a pre-adoption survey conducted in January-February and an after-implementation survey conducted in June-early July 2015 and interviews conducted in March and early April.

The principal decision to choose and implement the new system was a Regional Council Resolution. Neither the hospital's management board nor the employees had any direct influence. It was a top-down decision to be implemented down throughout the region. However, the management at the hospital took the decisions concerning when and how the implementation should take place and they decided how to organize the process.

The implementation was organized with a central steering committee and local steering groups in each of the departments. The local groups were headed by a project manager and a number of 'super-users' were selected from each department to get training in the EPR system before the implementation. The implementation of and communication about the new EPR system was thus very dependent on the functioning of the local project groups. Before the implementation from January to February 2015 almost all employees also had general training in the functioning of the EPR system.

The implementation process was characterized by a number of interesting features including technical problems with the new EPR system and innovative experiments with training programs for employees. In our analysis however, we focus on the ways the management may make a difference to the change process.

RESEARCH DESIGN, DATA AND METHODS

The conducted study is designed as a longitudinal case study, where the analyzed case is observed prior, during and after the actual implementation process. Prior to the implementation of the EPR at the hospital an initial survey was conducted measuring the support for the intervention and the employees' expectations to the effect of the new EPR on output quality, working procedures and cooperation and communication amongst the different hospital units and locations.

After the implementation process a similar survey was conducted again measuring the support for the intervention, actual output of quality, working procedures and cooperation and communication as well as experiences of managerial behavior and local implementation strategies.

During the implementation process 13 individual qualitative interviews with employees and managers as well as four focus group interviews with employees measuring the same elements as the surveys were conducted.

Based on these data the study investigates how an intervention is perceived and how different treatments (differences in managerial behavior) affect this perception in a positive or negative way. Thus the study resembles a natural experiment where the effect of different local managerial behavior and different local implementation strategies (the treatment) are investigated.

In the study the qualitative interviews are used to identify different managerial behavior and strategies as well as possible explanations for the development in the support for the intervention. On this basis formal hypothesis were developed and statistically tested in the quantitative survey data.

Data description and methods used

Both surveys were distributed to all nearly 4000 employees and local managers such as leading nurses or chief physicians or surgeons, who were to be users of the EPR. The response rates for the surveys were respectively 59 % and 52 %.

The employees and managers participating in the qualitative interviews and focus group interviews were selected so that all major professions and units and locations within the hospital were represented.

Based on the quantitative data the changes in support for the intervention has been described and three regression models were constructed in order to test the hypothesis that managerial behavior during the implementation affects the support of the intervention as well as employees assessment of the intervention's influence on output quality, working procedures and cooperation and communication between units and locations. In the regression models the predictors are entered simultaneously.

Dependent variables

The dependent variables in the regression models are three indexes. All the indexes are measured both in the survey prior to the implementation as well as in the survey after the

implementation. Before constructing the indexes exploratory factor analysis has been conducted and Cronbach's Alpha was calculated. Factors are identified based on factor loadings above 0.4 and all values of Cronbach's Alpha are 0.6 or above.

The first index, "general support" is measuring the overall support for the intervention. This index consists of variables measuring the overall support as well as the support in relation to the intended core function of the EPR: medical record keeping and cooperation / communication between units and hospitals. The index is constructed of 5 variables as described below:

- Do you in general support the decision to implement a new EPR
- Do you expect / experience that the new EPR improves the cooperation with other hospitals?
- Do you expect / experience that the new EPR improves cooperation between your hospitals units and locations?
- Do you expect / experience that the medical record keeping is easier with the new EPR?
- Do you expect / experience that the new EPR contributes to reduces in double recording?

The second index measures the experiences of how the new EPR affects the output quality of the work. This index consists of four variables as describes below:

- The new EPR helps / will help to improve the quality of the clinical work

- The new EPR helps / will help to improve the patient's experiences of quality
- The new EPR helps / will help to strengthen the documentation
- The new EPR improves / will improve the overall efficiency

The third index measures the working procedures. This index is based on five variables as described below.

- The new EPR is / will be difficult to adjust to the working procedures in my unit
- The new EPR is / will be difficult to adjust to my personal working procedures
- The new EPR is difficult to use
- The new EPR is less flexible
- It is difficult for my unit to change working procedures to adjust to the new EPR

Independent variables

The independent variables in the regression models are in all three models two indexes and one single item all measuring different managerial strategies and behavior. The single item measures whether or not a special planned and unit adjusted implementation strategy has been used in the unit. This has been the case in two larger units, a medical department and a pediatric department. The first index measures the experienced managerial behavior regarding information to the employees. This index consists of the following five items:

- Has received sufficient information about the implementation of the new EPR
- Has received sufficient information about the new EPR
- Has been sufficiently prepared to use the new EPR
- Knows where to address questions and ask for help / assistance

- Has received sufficient assistance and support when facing problems in relation to implementation of the EPR

The second index measures to which degree the managers have involved the employees in the implementation process. This index consists of the following three items:

- I have experienced that my opinion and concerns have been acknowledged and taken seriously
- I have experienced that the employees' need have been sufficiently considered and taken into account during the process
- My unit / location have had sufficient influence on the final construction of the EPR

Control variables

Besides the various dependent and independent variables the regressions models also include three control variables. These variables are gender, profession and whether or not the unit have unplanned or acute patients. Because the use of the EPR varies between the different professions some professions such as doctors and nurses are expected to be more influenced by implementations problems and by the intervention itself because they use the EPR very frequently throughout their shift and because their work highly relies on the information provided by the EPR. Some of the variances on the independent variables are therefore expected to be caused by professions. The profession variable is in the analysis used as a dummy variable. The variable has five categories and category 4, secretary, has been selected as the omitted category.

The degree to which the units have unplanned or acute patients are also expected to explain some of the variance on the dependent variables. Departments who have unplanned or acute patients have less control over the patient flow in and out the department. This also means that they have little possibility to schedule a reduced number of patients during the implementation process and therefore they are more likely to be (negatively) influenced by the intervention.

Below, the data are analysed by means of descriptive statistics and OLS regression analysis. Tests of the OLS regressions indicate no presence of multicollinearity² (no VIF values above 2.5).

² See appendix for Pearson correlations and analysis hereof

Table 1: Descriptive statistics of the variables included in the analysis

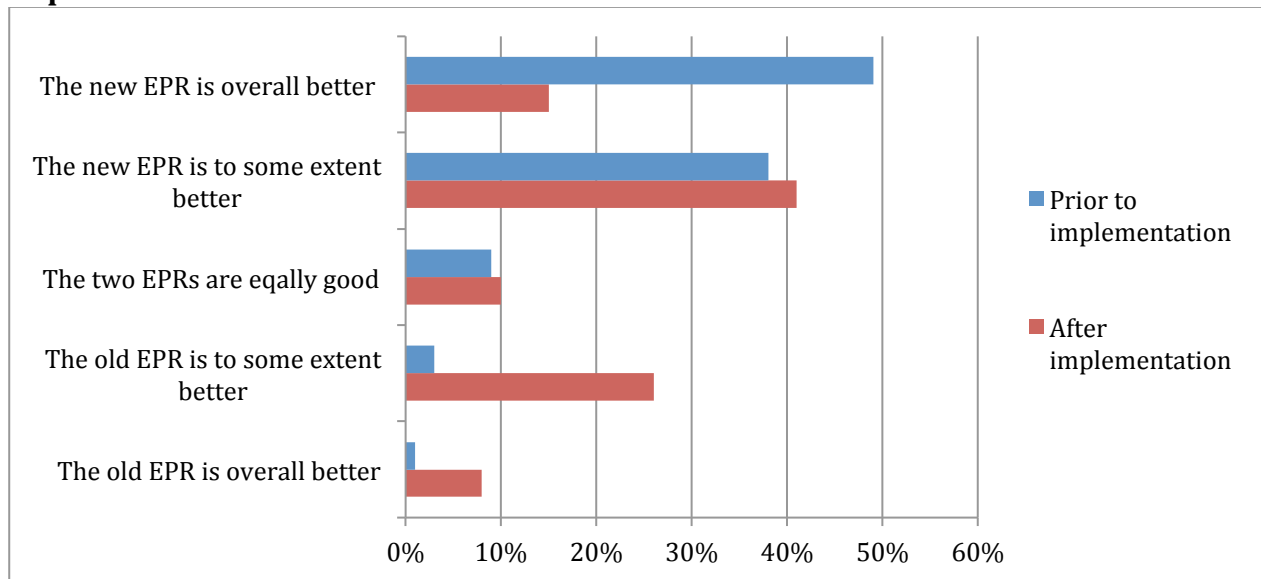
Variable	Observations (N)	Mean	Std. deviation	Minimum	Maximum
Profession	1873	2.5	1.3	1	5
Gender	1876	1.9	0.3	1	2
Planned or acute patients	1863	1.6	0.5	1	2
Information	1676	12.3	3.8	5	29
Involment of employees	1687	12.3	3.9	3	21
Special implementation strategy	1727	1.1	3.6	1	2
General support	1722	14.5	4.1	4	28
Output quality	1707	17.9	4.7	4	28
Output working procedures	1689	20.2	4.7	5	35

FINDINGS

Support for the intervention amongst the employees

Prior to the implementation a very strong support for the intervention amongst the large majority of employees could be observed. In general the employees supported the decision to implement a new EPR system, as 85 % of the employees were expecting that the new EPR in general represent an overall improvement compared to the EPR system the hospital had been using so far (see table. 2).

Table 2: Changes in the overall support for the intervention before and after the implementation



As table 2 shows the support for the EPR is very high prior to the implementation process.

However after the implementation there is significant decline in the support for the EPR.

Further descriptive statistics (not shown) reveals that the doctors have experienced the greatest decline in support during the implementation process. This tendency is also confirmed by the qualitative interviews. Here it is clear that the doctors in particular experience technical difficulties with the EPR and sometimes to an extent were they fear for the quality of their work and the patient safety.

The qualitative data in general point to that the employees prior to the implementation were very positive to the new EPR. Many of the informants stress that from a professional point of view the new standardized EPR is a good idea and a useful tool in many situations. The informants also stresses that prior to implementation the employees had great – and maybe too great – expectations to benefits they would experience when the EPR was implemented.

At the same time the qualitative data also points to the fact the extensive technical problems is a major explanation for the declining support among all groups of professional.

In relation to this the qualitative data also indicates that in particular departments where there is little control over the patient flow in and out of the departments they experience difficulties during the implementation due to the inability to schedule extra time and fewer patients during the implementation.

Aside from this the qualitative data also indicates that the managerial behaviour, to what extent supervision, information and training has been prioritized and to what extent there has been managerial responses to the employees concerns and problems (technical as well regarding the content and use of the EPR) plays an important role when explaining the support and the decline in support amongst the employees.

Based on our theoretical approach as well as the findings from the qualitative interviews 3 regression models were constructed aiming to test the explanation for the differences in support to the intervention.

The findings in the multivariate regression models (see table 3) only partly support H3. There is significant positive impact of the adapted implementation strategy on the overall support of the new EPR system, while the impact on quality (model 2) and working procedures (model 3) though positive is insignificant.

The findings in table 3 do support the H1 and H2, as both information and involvement have a significant positive impact on all three dependent variables.

The findings from the multivariate regression concerning our control variables should also be commented. The findings support the explanations given in the qualitative interviews regarding the different experiences between the professional groups at the hospital. Here the findings show highly significant and moderately strong effects of doctors and nurses on all three dependent variable. For the remaining professional groups the effects are small and not as highly significant.

The findings do not support that departments with acute or unplanned patients have a lower degree of support of the intervention and worse experiences with the EPR. The effects are small and insignificant. However descriptive statistics and binary regression of the effects of particular units and departments on the three dependent variables (not shown) reveals that there are in fact some significant effects of different types of units and departments. But the effects do not follow a pattern that relates to the type of department or to the degree of acute or unplanned patients. The findings rather suggest that there are some individual differences between the department and units that are explained by variables not included in the surveys e.g. other differences in local managerial behaviour and / or department culture and other local factors such work load, sufficient number of staffs etc. Since these factors are not measured in the survey no further conclusions can be made.

Table 3: Regression analysis of the intervention support and assessments of quality and working procedures

Model	1	2	3
Dep. variable	Overall support	Quality	Working procedures
1. Implementation strategy	0.5*	0.05 ns	0.03 ns
2. Information	0.21***	0.17***	0.2***
3. Involvement	0.29***	0.42***	0.33***
4. Doctor (Dum1)	0.2*	0.26***	0.21***
5. Nurse (Dum2)	0.13*	0.17***	0.16***
6. Care worker (Dum 3)	0.05*	0.03 ns	0.1**
7. Other healthcare prof. (Dum5)	0.09**	0.07*	0.01 ns
8. Acute department	-0.02 ns	-0.03 ns	-0.05 ns
9. Gender	-0.001 ns	-0.01 ns	-0.01 ns
R²	0.19	0.33	0.25
Adjusted R²	0.19	0.32	0.25
N	1602	1636	1625

Notes: *** Coefficient is significant at the 0.001 level, ** the coefficient is significant at the 0.01 level, * coefficient is significant at the 0.05 level, ns coefficient is not significant. Entries are standardized Beta coefficients.

It can be concluded that hypothesis 1 and 2 is supported by the findings in the multivariate regression analysis, while hypothesis 3 is partly supported (model 1)/partly rejected (model 2 and 3). Managerial behaviour in terms of information and employee involvement has a significant effect on all 3 dependent variables. The better information and the more involvement of and responsiveness towards the employees from the managers the stronger is the support for the EPR and less experiences of negative effects on the quality and working procedures dog the employees experience due to intervention.

It can also be concluded that the findings only partly support hypothesis 3. However one final remark should be made in relation to hypothesis 3. There are some indications (not shown) that in particular one of the local implementation strategies does influence the experience of information and involvement. This indicates that for one of the strategies in particular, there seems to be a partial indirect effect through the indexes measuring the managerial behaviour. This indicates that the implementation strategy indeed has some effect of the support and experiences of the intervention when the strategy implies a managerial behaviour that prioritizes information and involvements of the employees.

DISCUSSION

In our discussion of possible interpretations of our findings we will get back to the theoretical approaches and description of the empirical context that frames our analysis.

First however, a basic remark concerning our findings seems appropriate. It is a fact that the entire implementation process where characterized by severe technical problems with the new EPR system. None-the-less local differences in management proved very important to how the professionals (nurses, doctors, others) perceived the outcomes of the new system. Higher levels of relevant information, higher levels of employee involvement and influence and to some extent locally adapted implementation processes did show significant positive impact on the perceived outcomes of the new system despite the technical problems.

Second, the strong support to the new EPR system in the initial situation could be interpreted from both an institutional and a change management perspective. From an institutional perspective the logic of standardizing the EPR systems in the region were perceived to be a

natural next step in the evolution of such systems by most employees and prior to the implementation process many employees also experienced problems in sharing information across hospitals in the region. There was a national political decision to standardize the regional EPR systems and a regional political decision to implement the chosen specific system. And there was long-term experience from other hospitals with the chosen system. Thus both formal structure and informal norms and experience supported the process. From the point of change management recommendations all the eight factors suggested to be important were more or less in place. 1) A perceived need was ensured; 2) a plan was provided; 3) internal support for the change was ensured and there was neglectible resistance to overcome; 4) the support and commitment of top-management was ensured; 5) there was not only external support but also pressure to implement the new system; 6) resources were provided (but perhaps not enough); 7) it is certainly the intention to institutionalize change, but too early to say if they succeed; and 8) and they did pursue comprehensive change. Thus the two perspectives tend to support each other and we may actually suggest that it is much easier to fulfil the eight points of change management if the proposed change is in line with institutionalized global patterns of change perceived natural in an evolving world culture.

Nevertheless the initial support from employees and especially doctors radically declined during the change process. Despite long-term experience at other hospitals in the region with the chosen EPR system and an in many ways well prepared implementation process the high hopes turned into disappointment and fear of patient safety to many employees. It is a finding that cannot be explained by our included theories and represent a puzzle to the mainstream change management theories.

Nevertheless, besides technical problems, our case may represent a phenomenon well-known from case studies of implementation and reform processes (Baier, March, & Saetren, 1986; Brunsson & Olsen, 1993; Nørup & Hansen, 2015). In order to generate support to the implementation of a specific intervention, the management may feel a need to 'oversell' the proposed change and to downplay the significance of the difficulties in the implementation phase. However, by doing so the management creates problems to itself in the implementation process. Since expectations to the intervention are much higher than the real world of messy realities can deliver the short-term management process of generating support for the intervention tend to generate medium-term disappointments among employees and other stake-holders once visions designed to mobilize support for an idea confront messy day-to-day problems.

CONCLUSION

We have analysed the impact of managerial antecedents on the short-term outcomes of the implementation of a new EPR system at a Danish multi-site hospital.

Outcomes were measured as employee perceptions of 1) improved cooperation and medical record keeping; 2) improved quality and efficiency and 3) improved work processes.

Managerial antecedents were measured as 1) degree of information and assistance; 2) degree of employee involvement and influence and 3) local adaptation of implementation process.

We found significant positive impact on all three types outcome of managerial information and employee involvement (1 and 2), while local adaptation of the implementation process (3) only had significant impact on one of our outcome measures - improved cooperation and record keeping (1).

References

- Alexander, J. C., Giesen, B., Münch, R., & Smelser, N. J. (1987). *The Micro-Makro Link*. Berkeley: University of California Press.
- Allison, G. T. (1969). Conceptual Models and Cuban Missile Crisis. *American Political Science Review*, 63(3), 689-718. Retrieved from <Go to ISI>://A1969Y422400001
- Andersen, K. V. (2007). *Den Brugerdrevne Forvaltning. Muligheder og Grænser for Digitalisering*. København: Jurist- og Økonomforbundets forlag.
- Armenakis, A. A., & Bedeian, A. G. (1999). Organizational change: A review of theory and research in the 1990s. *Journal of Management*, 25(3), 293-315.
- Baier, V. E., March, J. G., & Saetren, H. (1986). Implementation and ambiguity. *Scandinavian Journal of Management Studies*, 2(3-4), 197-212. Retrieved from <http://www.sciencedirect.com/science/article/B6X23-45JTN0X-4/2/3ab00efdea970c5a5f7ec229127af679>
- Bourdieu, P. (1990). *The Logic of Practice*. Cambridge: Polity Press.
- Breidahl, K. N., Gjelstrup, G., Hansen, M. B., & Hansen, H. F. (2015). Evaluering af politisk-administrative reformer: En komparativ analyse af evalueringen af de største reformer i Danmark og Norge. *Økonomi og Politik*, 34-45.
- Brunsson, N., & Olsen, J. P. (1993). *The Reforming Organization*. London: Routledge.
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York: WW Norton & Company.
- Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. *Health Affairs*, 30(3), 464-471.
- Callen, J., Braithwaite, J., & Westbrook, J. (2009). The importance of medical and nursing sub-cultures in the implementation of clinical information systems. *Methods of information in medicine*, 48(2), 196.
- Car, J., Black, A., Anandan, C., Cresswell, K., Pagliari, C., McKinstry, B., . . . Sheikh, A. (2008). The impact of eHealth on the quality and safety of healthcare. *A Systemic Overview & Synthesis of the Literature Report for the NHS Connecting for Health Evaluation Programme*.
- DanskeRegioner. (2007). Notat: Historien om EPJ (Elektronisk Patientjournal).
- Deloitte. (2007). *Strategiske udviklingsveje for epj. Eksternt review af det hidtidige epj-arbejde. Bestyrelsen for den nationale epj-organisation*. Retrieved from København:
- DiMaggio, P. J., & Powell, W. W. (1991). Introduction. In P. J. DiMaggio & W. W. Powell (Eds.), *The new institutionalism in organizational analysis* (pp. 1-38). Chicago: University of Chicago Press.
- Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New public management is dead - long live digital-era governance. *Journal of Public Administration Research and Theory*, 16(3), 467-494. Retrieved from <Go to ISI>://000238425900007
- Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2008). *Digital Era Governance: IT Corporations, the State, and E-Government*. Oxford: Oxford University Press.
- Fernandez, S., & Rainey, H. G. (2006). Managing successful organizational change in the public sector. *Public Administration Review*, 66(2), 168-176. Retrieved from <Go to ISI>://000236133600002

- Fishenden, J., & Thompson, M. (2013). Digital government, open architecture, and innovation: why public sector IT will never be the same again. *Journal of Public Administration Research and Theory*, 23(4), 977-1004.
- Giddens, A. (1984). *The Constitution of Society. Outline of the Theory of Structuration*. Berkeley: University of California Press.
- Goldfinch, S. (2007). Pessimism, computer failure, and information systems development in the public sector. *Public Administration Review*, 67(5), 917-929. doi:10.1111/j.1540-6210.2007.00778.x
- Greenhalgh, T., Potts, H. W., Wong, G., Bark, P., & Swinglehurst, D. (2009). Tensions and paradoxes in electronic patient record research: A systematic literature review using the meta - narrative method. *Milbank Quarterly*, 87(4), 729-788.
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *Milbank Quarterly*, 82(4), 581-629. Retrieved from <Go to ISI>://000225794300001
- Hall, P. A., & Taylor, R. C. R. (1996). Political Science and the Three New Institutionalisms. *Political Studies*, 44, 936-957.
- Hansen, M. B. (2011). Antecedents of Organizational Innovation: The Diffusion of New Public Management into Danish Local Government. *Public Administration*, 89(2), 285-306. doi:10.1111/j.1467-9299.2010.01855.x
- Hansen, M. B., & Lauridsen, J. (2004). The institutional context of market ideology: A comparative analysis of the values and perceptions of local government CEOs in 14 OECD countries. *Public Administration*, 82(2), 491-524. Retrieved from <Go to ISI>://000221507500013
- Hansen, M. B., & Vedung, E. (2005). *Common Language in the Organization of Elder Care. Evaluation of a Standardized Classification System [In Danish: Fælles sprog i ældreplejens organiserings. Evaluering af et standardiseret kategorisystem]*. Odense: Syddansk Universitetsforlag.
- Hatch, M. J., & Cunliffe, A. L. (2006). *Organization Theory. Modern, Symbolic and Postmodern Perspectives* (2 ed.). Oxford: Oxford University Press.
- Hood, C. (1991). A Public Management for All Seasons. *Public Administration*, 69(1), 3-19. Retrieved from <Go to ISI>://A1991FF02300001
- Hood, C., & Margetts, H. (2007). *The Tools of Government in the Digital Age*. Hampshire: Palgrave MacMillan.
- Kotter, J. P. (1995). Leading Change: Why Transformation Efforts Fail. *Harvard Business Review*, 73(2), 59-67.
- Kuipers, B. S., Higgs, M., Kickert, W., Tummers, L., Grandia, J., & Van der Voet, J. (2014). The management of change in public organizations: A literature review. *Public Administration*, 92(1), 1-20.
- Lewin, K. (1947). Frontiers in Group Dynamics. Concept, Method and Reality in Social Science: Social Equilibria and Social Change. *Human Relations*, 1(1), 5-41.
- Lin, C., Lin, I.-C., & Roan, J. (2012). Barriers to physicians' adoption of healthcare information technology: an empirical Study on multiple hospitals. *Journal of medical systems*, 36(3), 1965-1977.
- Maillet, É., Mathieu, L., & Sicotte, C. (2014). Modeling factors explaining the acceptance, actual use and satisfaction of nurses using an Electronic Patient Record in acute care settings: An extension of the UTAUT. *International journal of medical informatics*, 84(1), 36-47.

- Meyer, J. W., Boli, J., Thomas, G. M., & Ramirez, F. O. (1997). World society and the nation-state. *American Journal of Sociology*, 103(1), 144-181. Retrieved from <Go to ISI>://A1997XP58000005
- Nørup, I., & Hansen, M. B. (2015). *Udfordringer ved implementering af større IKT projekter. Evaluering af COSMIC EPJ-projektet på Sygehus Lillebælt*. Retrieved from Aalborg:
- Pressman, J., & Wildawsky, A. B. (1973). *Implementation. How Great Expectations in Washington are Dashed in Oakland: Or, Why it is Amazing that Federal Programs Work at All, This Being a Saga of Economic Development Administration as Told by Two Sympathetic Observers Who Seek to Build Morals on a Foundation of Ruined Hopes*. Berkeley, CA: University of California Press.
- Roness, P. (1997). *Organisasjonsendringar. Teoriar og strategiar for studiar av endringsprosessar*. Bergen: Fagbokforlaget.
- Rothstein, B. (1998). *Just Institutions Matter. The Moral and Political Logic of the Universal Welfare State*. Cambridge: Cambridge University Press.
- Scott, W. R. (2001). *Institutions and Organizations* (2 ed.). Thousand Oaks: Sage.
- Warfvinge, J. E. (2012). *EPJ i Danmark før regionsdannelsen i 2007. En undersøgelse af evalueringer af Elektronisk Patientjournal i klinikken*. (Master), Aalborg Universitet, Aalborg.
- Westland, C., & Clark, T. (2000). *Global Electronic Commerce. Theory and Case Studies*. Cambridge Massachusetts: MIT Press.
- Yukl, G. (2010). Leading Change in Organizations. In G. Yukl (Ed.), *Leadership in Organizations* (7 ed., pp. 296-328). Upper Saddle River: Pearson.